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Al/C1₂ Molten Salt Battery

The problem:

Many large, electrically powered devices, such as electric vehicles, require a compact energy source which is capable of providing the relatively large amount of energy necessary for operation.

The solution:

An aluminum chloride, molten salt battery has been developed with a theoretical energy density of 5.2 j/kg (650 W-h/lb). The battery, which operates at 150°C, can be used in the primary mode or as a rechargeable battery.

How it's done:

The battery has an aluminum anode and a chlorine cathode. The electrolyte is a mixture of AlCl₃, NaCl, and some alkali metal halide such as KCl. With KCl, the electrolyte composition is 66-20-14 mol % of AlCl₃, NaCl, and KCl, respectively.

The chlorine cathode is made corrosion resistant by using porous carbon as the substrate. The carbon is machined to a cylinder, 4.5 cm in length with a 1.9 cm diameter. An internal concentric hole (diameter 0.3 cm) is drilled to within 0.8 cm of the base of the

cylinder. The highest current density is achieved when chlorine bubbles slightly, under a pressure of 1.7×10^5 N/m² (10 psig).

The aluminum electrode is a 5.3-cm high, 4.3-cm wide cylinder that fits concentrically around the carbon electrode.

The cell provides 20 mA/cm² at a cell potential of 1.8 V.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
NASA Headquarters
Code KT
Washington, D.C. 20546
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Patent status:

No patent action is contemplated by NASA.

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